SAMPLE PAPER

Aakash

YOUNG TALENT SEARCH EXAM

YTSE-2013

Science, Mathematics & Mental Ability

(for VIII Studying Students)

Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Ltd.)

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1. A perpendicular force of 600 N acts on a circular surface of radius 1.4 m. The surface will just break if an additional perpendicular force of 16 N is applied on it. The maximum pressure that the surface can withstand is
   (1) 50 Pa  (2) 100 Pa  (3) 175 Pa  (4) 200 Pa

2. Which of the following is always an attractive force?
   (1) Magnetic force  (2) Electrostatic force  (3) Frictional force  (4) Gravitational force

3. Two mirrors inclined at equal angle with the vertical are placed in contact with each other as shown in the figure. When a ray of light strikes mirror-1, vertically, a parallel ray is reflected back by mirror-2. What is the value of angle $\theta$ between the mirrors?
   (1) 45°  (2) 30°  (3) 90°  (4) It can take any value

4. A boy running towards a plane mirror sees that his image is approaching him at speed $V$. The speed of the boy is
   (1) $V$  (2) $\frac{V}{2}$  (3) $4V$  (4) $2V$

5. Light year is a unit of
   (1) Speed  (2) Time  (3) Distance  (4) Temperature

6. Which of the following planet is also known as 'Budh'?
   (1) Venus  (2) Mercury  (3) Jupiter  (4) Uranus

7. Which of the following is not a good conductor of electricity?
   (1) Graphite  (2) Distilled water  (3) Tap water  (4) Bronze

8. Which of the following instruments is used in submarines to keep watch on enemies?
   (1) Kaleidoscope  (2) Electroscope  (3) Periscope  (4) Hydrometer

9. The beaker shown below contains some liquid. Which of the following is true about the liquid pressure at various indicated points?
   (1) $P_C > P_A = P_B > P_D$  (2) $P_C = P_D > P_B > P_A$
   (3) $P_A > P_B > P_C = P_D$  (4) $P_A = P_B = P_C = P_D$
10. Which of the following is not an application of Geo-stationary satellites?
   (1) TV broadcasting  (2) Radio Communication  (3) Earth-Mapping  (4) Weather forecasting

11. Black gold is
   (1) Coal  (2) Charcoal  (3) Bitumen  (4) Petroleum

12. Which of the following substances is not obtained during refining of petroleum?
   (1) Coke  (2) Kerosene  (3) Lubricating oil  (4) Paraffin

13. A highly reactive element, which is stored in water is
   (1) Sodium  (2) Potassium  (3) Carbon  (4) Phosphorus

14. Hydrogen gas is evolved during the reaction between
   (1) Copper and dilute Hydrochloric acid  (2) Magnesium and Oxygen  (3) Aluminium and Sodium Hydroxide  (4) Sulphur and dilute Hydrochloric acid

15. The correct order of increasing reactivities of zinc, iron and copper is
   (1) Iron < Copper < Zinc  (2) Copper < Iron < Zinc  (3) Zinc < Iron < Copper  (4) Copper < Zinc < Iron

16. Which of the following is not responsible for the formation of acid rain?
   (1) Oxide of sulphur  (2) Oxide of calcium  (3) Oxide of phosphorus  (4) Oxide of carbon

17. A deadly poisonous gas, produced during incomplete combustion of a fuel is
   (1) Carbon monoxide  (2) Carbon dioxide  (3) Nitrogen  (4) Nitrogen oxide

18. Which of the following is a metal-pair that can be cut with a knife?
   (1) Sodium and Carbon  (2) Lead and Phosphorus  (3) Sodium and Potassium  (4) Phosphorus and Carbon

19. Which of the following is not a characteristic of good fuel?
   (1) High calorific value  (2) High ignition temperature  (3) Easy accessibility  (4) Less residue production

20. Consider the following statements:
   Statement-I : Water is not suitable to extinguish fires involving oil and petrol.
   Statement-II : Being lighter than oil, water floats over the surface of oil.
   Choose the correct option
   (1) Both the statements are correct  (2) Both the statements are incorrect  (3) Statement-I is correct, Statement-II is incorrect  (4) Statement-II is correct, Statement-I is incorrect

21. The fusion of male gamete 'X' and female gamete 'Y' results into the formation of 'Z'. The 'Z' is embedded into the lining of the
   (1) Fallopian tube  (2) Vagina  (3) Ovary  (4) Uterus
22. All of the following are used to remove unwanted plants from the field, except
   (1) Seed drill  (2) Cultivator
   (3) 2, 4-D  (4) Khurpi

23. The symbiotic bacterium which lives in root nodules of leguminous plants and fix atmospheric nitrogen is
   (1) Rhizobium  (2) Acetobacter
   (3) Lactobacillus  (4) Nostoc

24. **Statement-1:** In wildlife sanctuaries poaching or capturing of animals is allowed.
    **Statement-2:** The finest Indian teak is found in Satpura National Park.
    (1) Statement-1 is true and Statement-2 is false
    (2) Statement-1 is false and Statement-2 is true
    (3) Both the statements are true
    (4) Both the statements are false

25. | Disease  | Carrier | Causative Agent |
    |-------|--------|----------------|
    | 1. Malaria | A | B |
    | 2. C | Aedes Mosquito | Virus |

Identify A, B and C.
(1) A- Anopheles mosquito, B-Protozoan, C-Dengue
(2) A- Culex mosquito, B-Virus, C-Polio
(3) A- Ascaris, B-Bacterium, C-Ringworm
(4) A- Anopheles mosquito, B-Bacterium, C-Dengue

26. | Hen, Frog, Human, Silkmoth, Starfish |
How many of the above organisms are oviparous and undergo internal fertilisation?
(1) Four  (2) Two
(3) One  (4) Three

27. The chemicals which are used in refrigerators and damage the layer which protects us from UV rays are
   (1) Greenhouse gases
   (2) Oxides of Sulphur
   (3) Suspended particulate matter
   (4) Chlorofluorocarbons

28. Select the endocrine gland according to the given information.
    I. Synthesis of hormone requires iodine
    II. Gland located in the neck
    (1) Adrenal gland
    (2) Thyroid gland
    (3) Pancreas
    (4) Ovary

29. HIV can be transmitted from one person to another through all of the following ways, except
    (1) Sexual contact
    (2) Sharing syringes of infected patients
    (3) Sharing of contaminated food and water
    (4) Infected mother to infant through her milk

30. Select the incorrect statement.
    (1) Ganga Action Plan was launched in 1985
    (2) GAP was launched with an aim to reduce pollution levels in the river
    (3) Arsenic, lead and fluorides are essential for growth and development of plants and animals
    (4) Many industries discharge harmful chemicals into rivers and streams causing pollution of water
31. A is 75% more than B, C is 3/4 of A and D is 65% more than C. What percentage of B is D?
   (1) 126.11%  (2) 291.81%
   (3) 126.56%  (4) 216.56%

32. Which of the following statements is not true?
   (1) Rational numbers are not closed under division
   (2) Division is not commutative for rational numbers
   (3) Subtraction is associative for rational numbers
   (4) 1 is the multiplicative identity for rational numbers

33. Which of the following is not equal to $1.8 \times 10^{-18}$?
   (1) $0.0000018 \times 10^{-23}$
   (2) $18000 \times 10^{-22}$
   (3) $0.18 \times 10^{-17}$
   (4) $0.00000018 \times 10^{-10}$

34. If six cubes, each of edge 7 cm are joined end to end, then the total surface area of the resulting figure is
   (1) 1344 cm$^2$
   (2) 1299 cm$^2$
   (3) 1356 cm$^2$
   (4) 1274 cm$^2$

35. The expression $\sqrt[3]{\frac{x^4}{y^2}}$ is equivalent to
   (1) $\sqrt[3]{x}$
   (2) $\sqrt[3]{y}$
   (3) $x^2$
   (4) $y^2$

36. The number of months in which the amount of ₹ 610 yields ₹ 106.75 as interest at 3.5% p.a. of simple interest is
   (1) 48  (2) 60
   (3) 36  (4) 72

37. A sum at $n\%$ compound interest doubles in four years. In 12 years, it will be \(m\) times of the original principal. The value of \(m\) is
   (1) 4  (2) 6
   (3) 8  (4) 10

38. How many non-square numbers are there between 4489 and 4624?
   (1) 137  (2) 136
   (3) 134  (4) 135

39. Sehwag hits 150 runs during a test match. 20% of the runs came in 6's, 40% in 4's, 24% in 2's and rest in 1's. Number of runs scored by him in singles is
   (1) 15  (2) 30
   (3) 12  (4) 24

40. If the total surface area of a cube is 28566 cm$^2$, then its volume is
   (1) 328509 cm$^3$
   (2) 289715 cm$^3$
   (3) 342500 cm$^3$
   (4) 343100 cm$^3$

41. If a sum of money amounts to ₹ 795070 in 3 years at 7.5% per annum compounded annually, then the sum (in ₹) is
   (1) 6,40,000
   (2) 6,48,000
   (3) 6,72,000
   (4) 5,78,000

42. A shopkeeper sells a washing machine at 20% above its cost price. If he had bought it at 10% more than what he paid for it and sold it for ₹ 8 more, he would have gained 10%. The cost price of the washing machine is
   (1) ₹ 801
   (2) ₹ 810
   (3) ₹ 790
   (4) ₹ 800

43. The circular end of a road roller has a diameter 0.7 m and its width is 4 m. The least number of revolutions that the roller must make in order to level a playground measuring 264 m by 160 m is
   (1) 4300
   (2) 4100
   (3) 4800
   (4) 4700
44. Which of the following numbers is not a Hardy-Ramanujan number?
(1) 4104 (2) 13832
(3) 1729 (4) 6859

45. If \( \sqrt{\frac{p}{q}} + \sqrt{\frac{q}{p}} = \frac{10}{3} \), then the value of \( p : q \) can be
(1) 4 : 3 (2) 1 : 2
(3) 3 : 4 (4) 9 : 1

46. The width of the classes 9.5 – 14.5, 14.5 – 19.5, 19.5 – 24.5 ... is
(1) 6 (2) 5
(3) 8 (4) 7

47. In the given figure, \( PQRS \) is a square and \( RSTU \) is a rhombus. If \( \angle PST = 110^\circ \), then the measure of \( \angle TUR \) is
\[ \begin{align*}
\text{Diagram of PQRS and RSTU with angles} \\
\text{Options:} & \quad (1) 90^\circ \quad (2) 20^\circ \quad (3) 45^\circ \quad (4) 75^\circ
\end{align*} \]

48. If \( \frac{3x - 4}{3x + 2} = \frac{5x - 7}{5x + 2} \), then the value of \( x \) is
(1) 1 (2) 2
(3) 3 (4) 4

49. The expression \( 3a^5b^6 + 9a^4b^3 - 12a^7b^5 \) can be factorised as
(1) \( 3a^4b^3(3b^3 - 4a^3b^2) \)
(2) \( 3a^2b^2(ab^3 + 3a - 4a^3b^2) \)
(3) \( 9a^4b^3(ab^3 + ab - 2a^3b^2) \)
(4) \( 9a^4b^3(ab^3 + 3 + 4a^3b^2) \)

50. How many numbers are there which are cube of itself?
(1) 0 (2) 3
(3) 2 (4) 1

51. The co-ordinates of the point \( A \) in the graph are
\[ \begin{align*}
\text{Diagram of XY axis with A marked}
\text{Options:} & \quad (1) (4, 3.5) \quad (2) (3.5, 4) \quad (3) (4, 4) \quad (4) (4, 3)
\end{align*} \]

52. One of the factors of \( a(b^2 - c^2) + b(c^2 - a^2) + c(a^2 - b^2) \) is
(1) \( b + c \) (2) \( 2a + b \)
(3) \( 2c + b \) (4) \( c - b \)

53. Rashi takes 80 minutes in covering a distance of 360 m. The distance she would cover in 400 minutes is
(1) 1200 m (2) 1500 m
(3) 1600 m (4) 1800 m

54. Which of the following is a linear equation in one variable?
(1) \( 3x + 2 = y + 3 \) (2) \( 4x - 5 = 4x + 12 \)
(3) \( 5x + 2 = 7 \) (4) \( 7x + 2 \)

55. If 42 persons can do a piece of work in 20 days, then the number of persons that can do it in 14 days is
(1) 60 (2) 30
(3) 40 (4) 50
SECTION-C : MENTAL ABILITY

56. If ‘+’ becomes ‘×’, ‘×’ becomes ‘÷’, ‘÷’ becomes ‘–’ and ‘–’ becomes ‘+’, then find the value of

\[28 \times 1.4 - 3.6 + \frac{1}{4} ÷ 19 = ?\]

(1) 2.1  
(2) 1.9  
(3) 19  
(4) 21

57. Find the missing links to complete the pattern.

\[p \ q \ ___ \ s \ t \ ___ \ u \ ___ \ w \ w \ x\]

(1) q v t r  
(2) q r v t  
(3) q r t v  
(4) None of these

58. XMLR : ZOPV :: CRLQ : ?

(1) ETPU  
(2) EUPU  
(3) FTUP  
(4) ETPV

59. 4 : 10 :: 3 : 7.5 :: 6 : ?

(1) 13  
(2) 18  
(3) 15  
(4) 16

60. Complete the following series

6, 10, 17, 27, 40, ?

(1) 49  
(2) 56  
(3) 58  
(4) 52

61. R is to the north of S and east to that of T. M is to the south of T and west to that of S. Q is to the south R. Find the direction of Q.

(1) To the southeast of M  
(2) To the northeast of M  
(3) Cannot be determined based on the above given data  
(4) Either (1) or (2)

62. 5 : 50, 12 : 288, 9 : 162, 7 : ?

(1) 98  
(2) 81  
(3) 126  
(4) 128

Direction for Qs. 63 & 64 :

In the figure given above all the smaller cubes shown are of same dimensions and they all make up this whole solid consisting of \( x \) such small cubes. Suppose all the possible outer faces of this solid is painted in red then it was found that there are \( y \) smaller cubes which have got exactly three of their faces painted in red.

63. \( x = ? \)

(1) 128  
(2) 72  
(3) 86  
(4) 68

64. \( y = ? \)

(1) 8  
(2) 10  
(3) 12  
(4) 14

Space for Rough Work
Direction for Qs. 65 to 67:

Solve the number puzzle given above by using the exact logic involved and then find the number that should replace variables 'x', 'y' and 'z'.

65. \( x = ? \)
   (1) –32 \hspace{1cm} (2) –38
   (3) –56 \hspace{1cm} (4) –42

66. \( y = ? \)
   (1) 1 \hspace{1cm} (2) –1
   (3) 0 \hspace{1cm} (4) –2

67. \( z = ? \)
   (1) –91 \hspace{1cm} (2) –19
   (3) –126 \hspace{1cm} (4) –64

68.  
\[
\begin{array}{ccc}
4 & 30 & 6 \\
5 & 27 & 4 \\
2 & ? & 7 \\
\end{array}
\]
   (1) 27 \hspace{1cm} (2) 30
   (3) 37 \hspace{1cm} (4) 20

Direction for Qs. 69 to 71:

A, B, C, D, E and F are sitting around a circular table facing the centre such that A is third to the left of D while C is fourth to the right of F who is not sitting adjacent to B.

Based on the above given information answer the following questions.

69. If F and B interchange their places then B is sitting \_ to the right of C.
   (1) Fourth \hspace{1cm} (2) Second
   (3) Third \hspace{1cm} (4) None of these

70. If C & E and F & A interchange their places then A is \_ to the left of E.
   (1) Fourth \hspace{1cm} (2) Second
   (3) Third \hspace{1cm} (4) None of these

71. How many persons where sitting between F and C?
   (If viewed clockwise from F to C)
   (1) Four \hspace{1cm} (2) Two
   (3) Either one or three \hspace{1cm} (4) One

72. Find the odd one out.
   (1) Eyewitness \hspace{1cm} (2) Tyineewess
   (3) Ewityssine \hspace{1cm} (4) Ieytnewses

73. Find the odd one out.
   (1) Indore \hspace{1cm} (2) Delhi
   (3) Jaisalmer \hspace{1cm} (4) Kanpur

74. Find the mirror image of EMAGINE.
   (1) EMAGINE \hspace{1cm} (2) EMAGINE
   (3) EMAGINE \hspace{1cm} (4) EMAGINE

75. South : Northeast :: Northeast : ?
   (1) West \hspace{1cm} (2) Southwest
   (3) Northwest \hspace{1cm} (4) South
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